An idle telephone line tempts designers to use its 48V potential as a power source. However, Part 68 of the US Federal Communications Commission's telecommunications regulations states that any device that connects to the phone line and is not actively communicating must present a resistance of at least 5 MΩ (**Reference 1**). To meet this requirement, a device's continuous-current drain must not exceed 10 μA. Fortunately, many devices that connect to the phone line do not require continuous power and can remain off for long intervals, awakening only for a short time before relapsing into power-off mode. Providing power for these applications from the phone line presents obvious advantages by eliminating the need for a battery or another power source and the cost of battery maintenance.

The circuit in **Figure 1** charges a 1.5F supercapacitor, C_1, from the phone line through a diode bridge and a 5.6-MΩ resistor. A **Maxim MAX917** nanopower comparator, IC_1, consumes only 0.75 μA from its power supply. Resistors R_2 and R_3 halve the voltage across C_1 and apply it to IC_1's positive input voltage at Pin 3 for comparison with its built-in 1.245V reference. For voltages across C_1 that do not exceed 2.49V, IC_1's output at Pin 6 remains low. When C_1's voltage reaches 2.5V, Pin 3's voltage exceeds the reference voltage, and IC_1's output goes high, turning on Q_1 and Q_2.

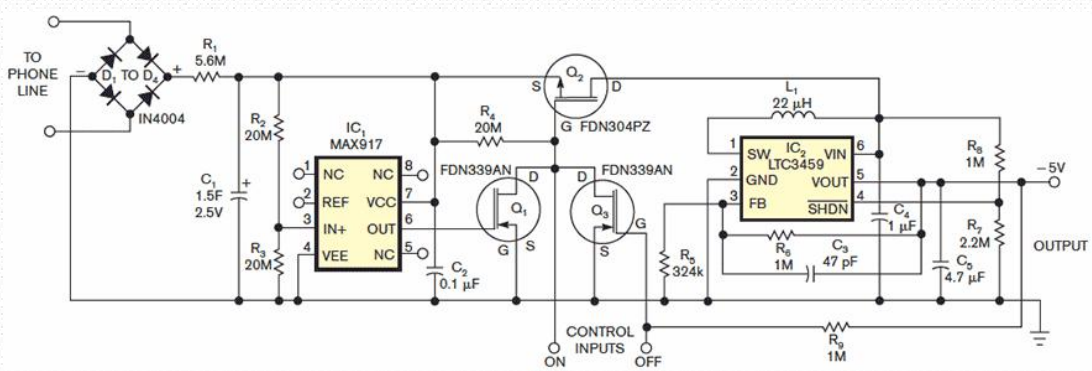

Figure 1 This power-conversion circuit delivers intermittent bursts of regulated voltage from a supercapacitor charged by a trickle of current from a telephone line.

Several days must elapse before C_1 becomes fully charged, given its huge capacitance and a charging current of less than 10 μA. The voltage on C_1 can never exceed 2.5V because, once it reaches 2.49V, Q_1 and Q_2 turn on, connecting C_1 to a switched-mode-power-supply circuit. Because the power-supply current exceeds the charging current, the voltage across C_1 starts to decrease when Q_2 turns on. Transistor Q_3 holds Q_2 on when C_1's decreasing voltage causes Q_1 to turn off.

The switched-mode-power-supply circuit comprises a **Linear Technology LTC3459** micropower boost converter, IC_2, and its associated components, which deliver 5V at 10 mA. A fully charged C_1 can supply power to a 10-mA load for approximately 40 sec. With no load, the circuit can sustain its 5V output for more than 10 hours. For greater output current and shorter operating time, select another boost converter that can operate at a low input voltage.

Mechanical switches, open-drain MOSFETs, open-collector transistors, or a microcontroller's open-drain output pins can drive two external control inputs to force the circuit on and off. Pulling the On input low forces Q_2 to turn on and deliver power from C_1 to the power converter, and pulling the Off input low turns off Q_2 and removes power from the converter. Note that the power converter's output-return line connects to the telephone line and thus should not connect to an earth ground or to grounded equipment.

Reference

1. "**Part 68**," Federal Communications Commission.

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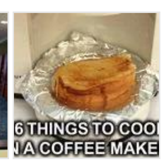
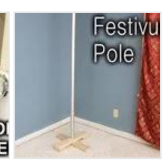
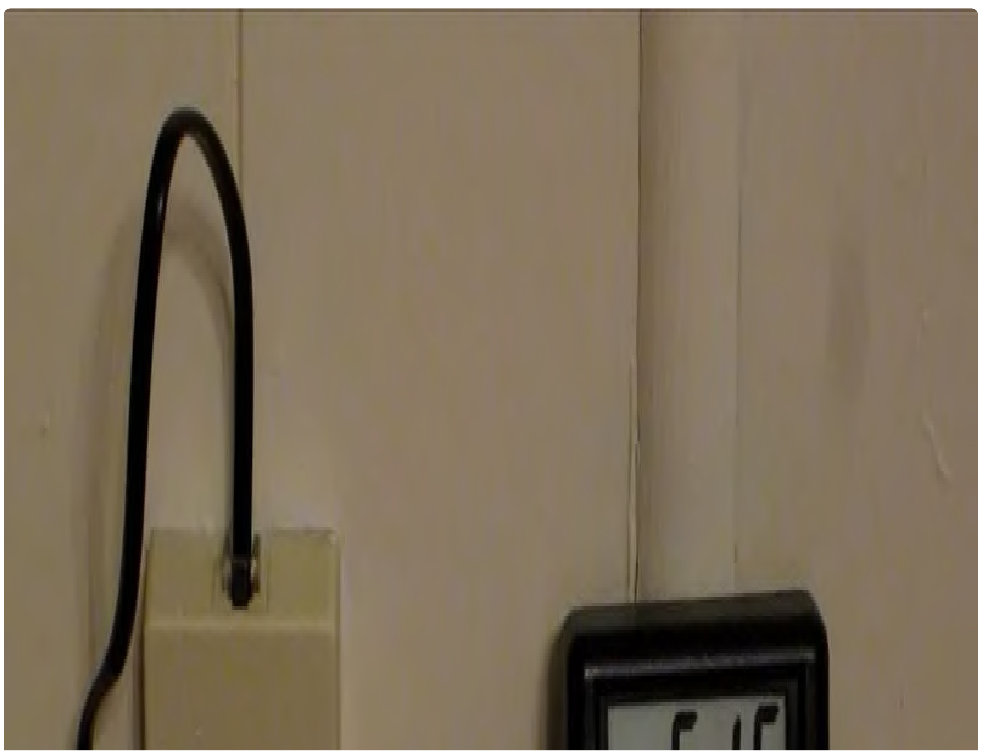




not in use, this is a constant DC signal (about 50-60 volts). When the phone rings, the signal is a 20 hertz AC signal (about 90 volts). When in use it is a modulated DC signal (between 6 and 12 volts).

The phones lines even have power during a blackout in most cases. This is because the phone company maintains their own backup power system. Your phone lines may be powered even if you don't have a land line service set up.

Step 2: Check the Phone Line With a Multimeter



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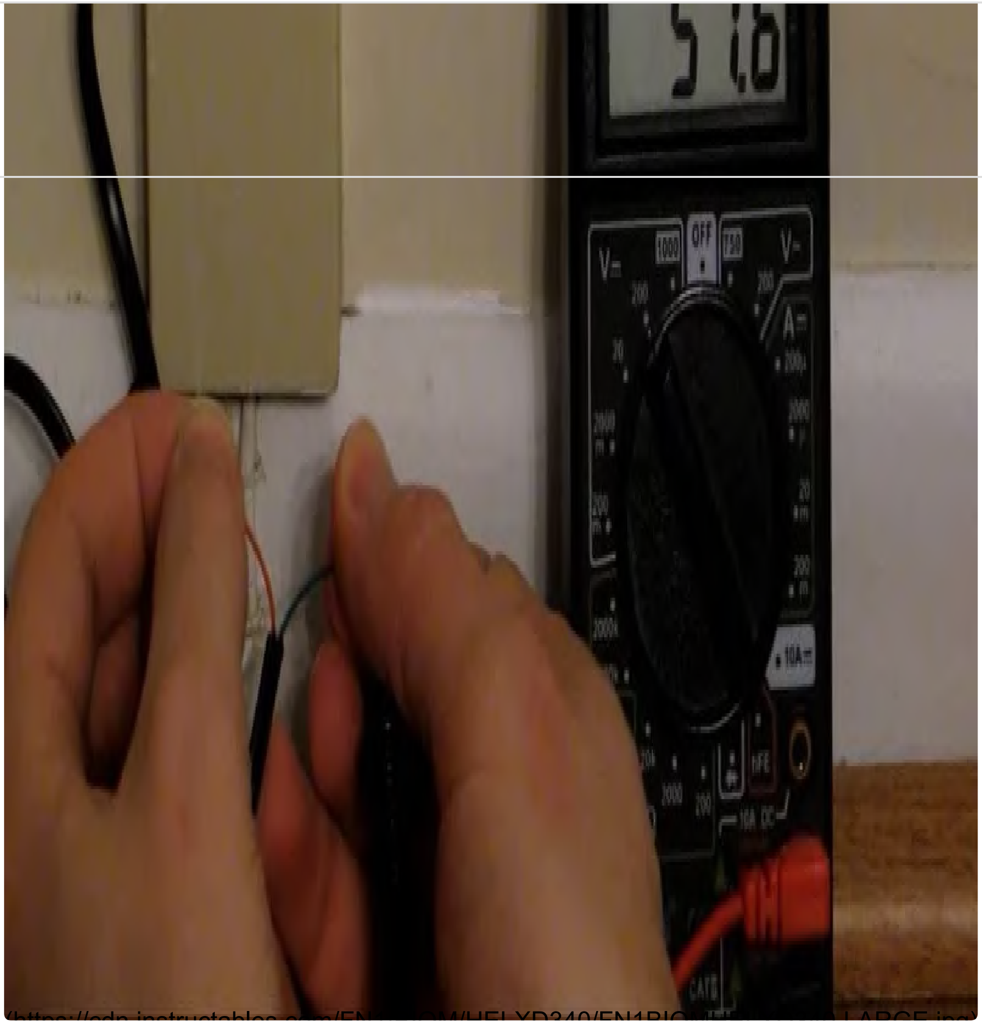
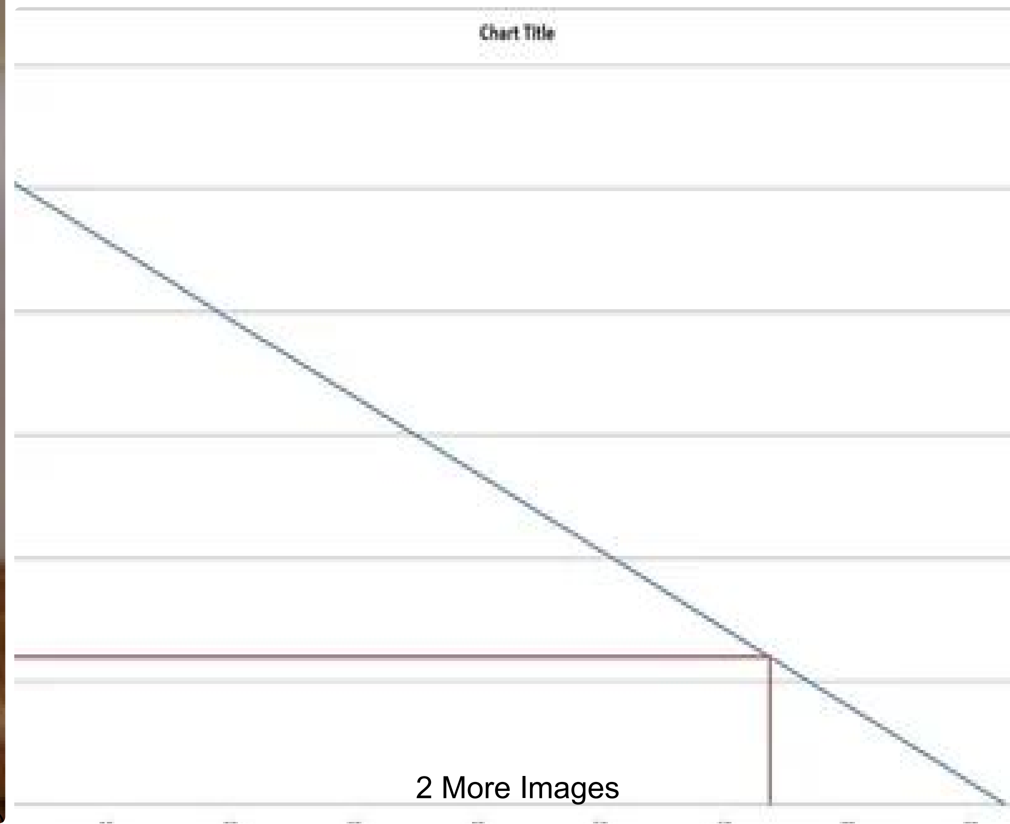




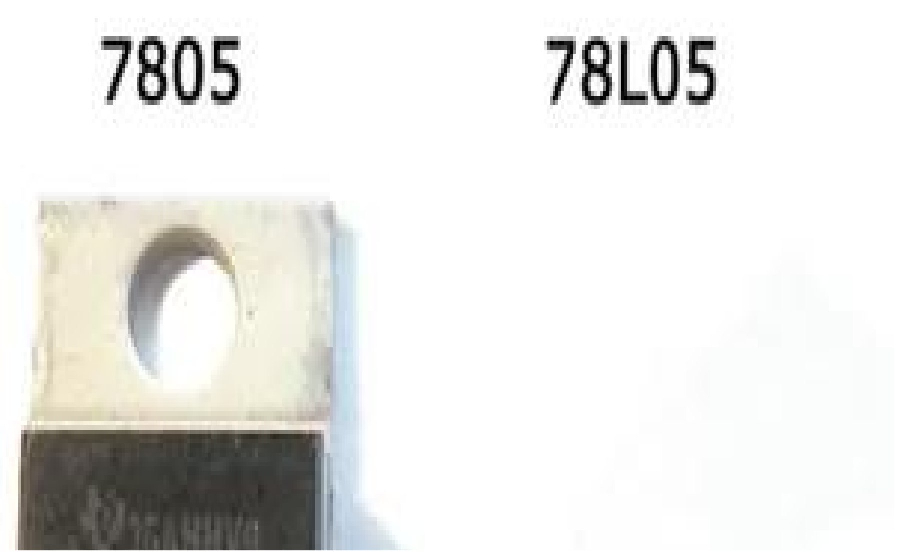
Before you try to tap into the electricity in the phone line, you should check it with a multimeter to see what you are working with.

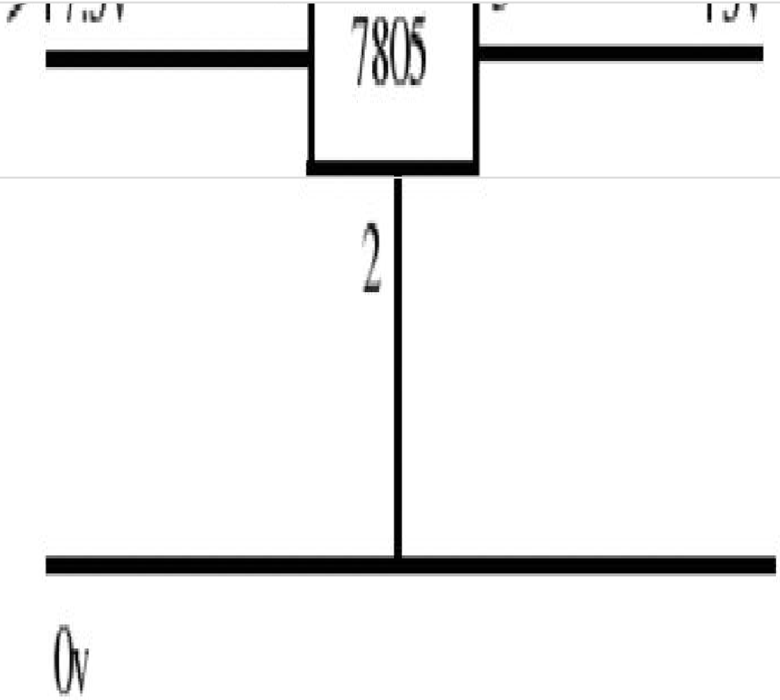
Start by cutting open a phone cord and separating the internal wires. In most cases you will have one red wire and one green wire. Strip the insulation off the ends. Then plug the cord into a phone jack and use a multimeter to measure the output voltage. At my house, I measured an open-circuit (no load) voltage (http://en.wikipedia.org/wiki/Open-circuit_voltage) of 52 volts DC.

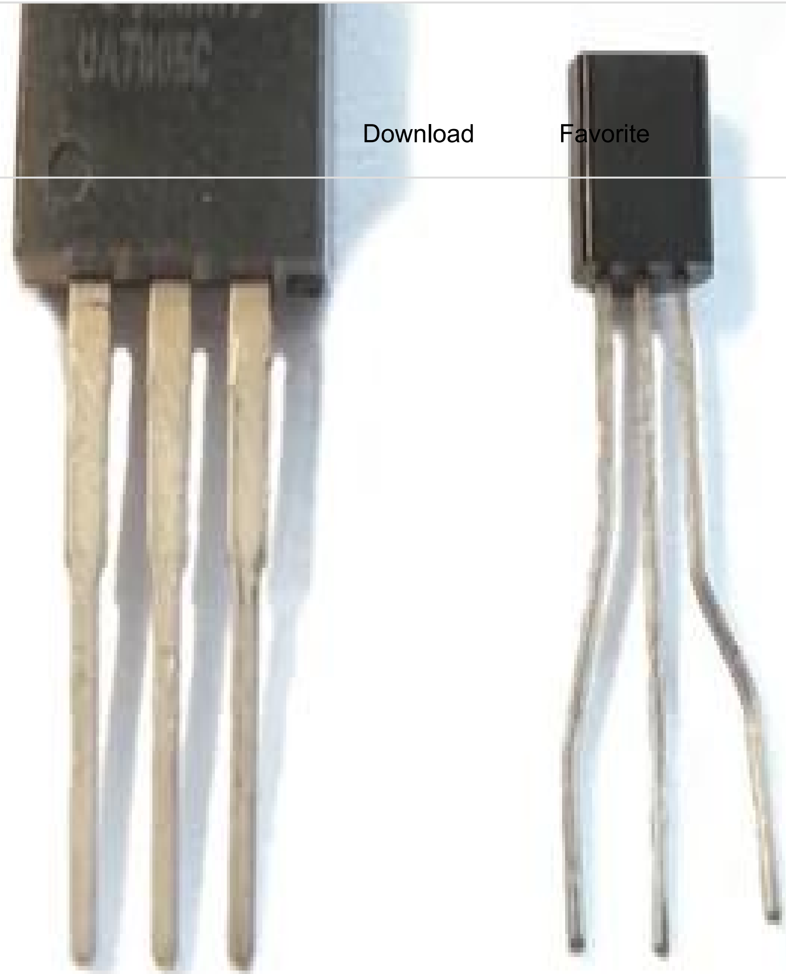
Then I hooked up various resistors to see what the output would be with different loads. I determined that the supply voltage isn't regulated. This means that the voltage changes depending on the resistance of the circuit that it is powering. After some calculating, I worked out that the base signal coming out of my phone jack pretty closely resembles a 52 Volt DC source (http://en.wikipedia.org/wiki/Voltage_source) with a 628 ohm internal resistance (http://en.wikipedia.org/wiki/Internal_resistance).

Basically this means that I can run a 12V circuit at 64mA, a 9V circuit at 68mA, or a 5V circuit at 75mA. This isn't a lot. But it is enough to charge a cell phone.

Step 3: Construct a Simple Voltage Regulator Circuit







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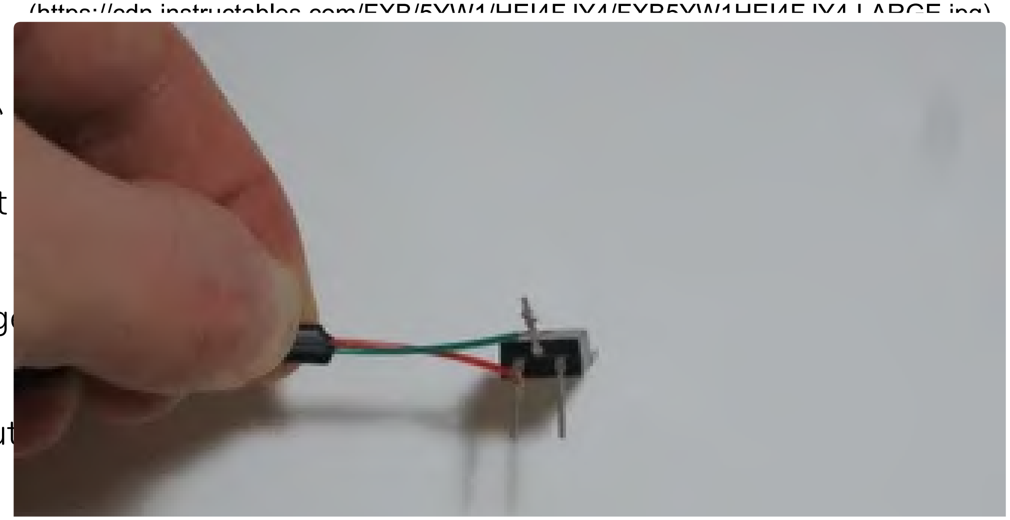

We know that the phone needs 5 volts in order to charge. But much current it draws or it's equivalent load resistance (http://en.wikipedia.org/wiki/Electrical_load). So we can't charg from the phone line. We need to use a voltage regulator (http://en.wikipedia.org/wiki/Voltage_regulator) to bring the out

down to 5 volts and keep it there. A LM7805 5 volt regulator s

To make this simple phone line adapter you will need the phon
been working with, the 5V voltage regulator and a USB connector cable with a female end. Just connect the red wire from the phone line to the first lead on the regulator and connect the green wire from the phone line to the second lead. Then connect the black wire from the USB cable to the second lead on the regulator and connect the red wire from the USB cable to the third lead on the regulator. If you can't solder the wires together (because the power is out), you can just wrap the wires around each lead. If you do this, you should bend the leads of the regulator away from each other. This will help you avoid accidentally crossing the wires.

This simple regulator circuit is able to safely convert the base phone signal into something that can be used to charge your phone. However, many voltage regulators are not able to handle the AC signal that they would receive if the phone rang. So if you are worried that you might receive a call while your regulator is hooked up to the phone line , then you may wish to add a diode between the red wire from the phone line and the first pin on the voltage regulator. This will protect your circuit from problems that may be caused by reverse polarity.

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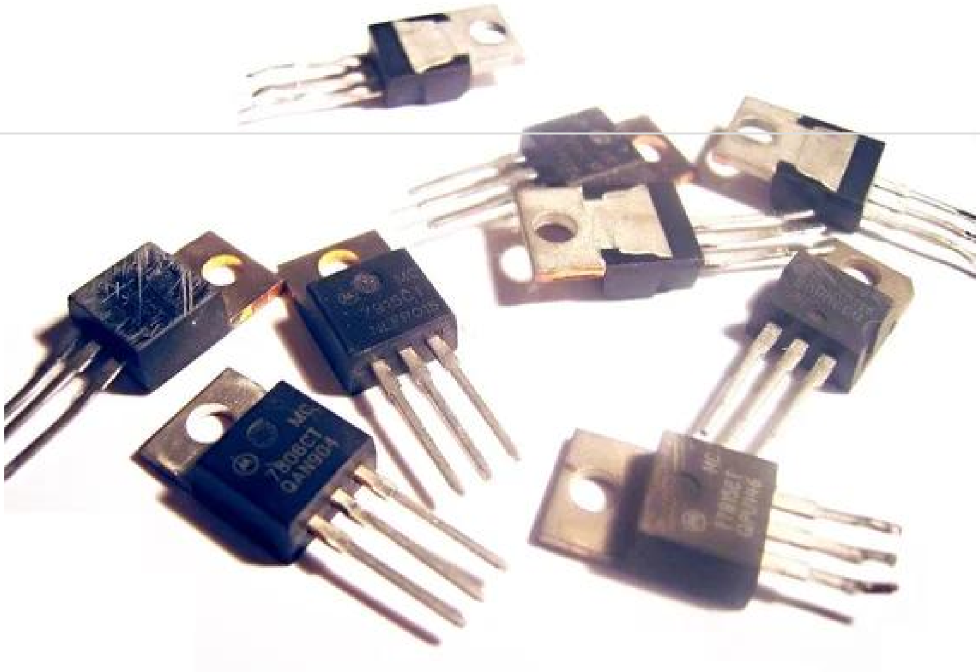
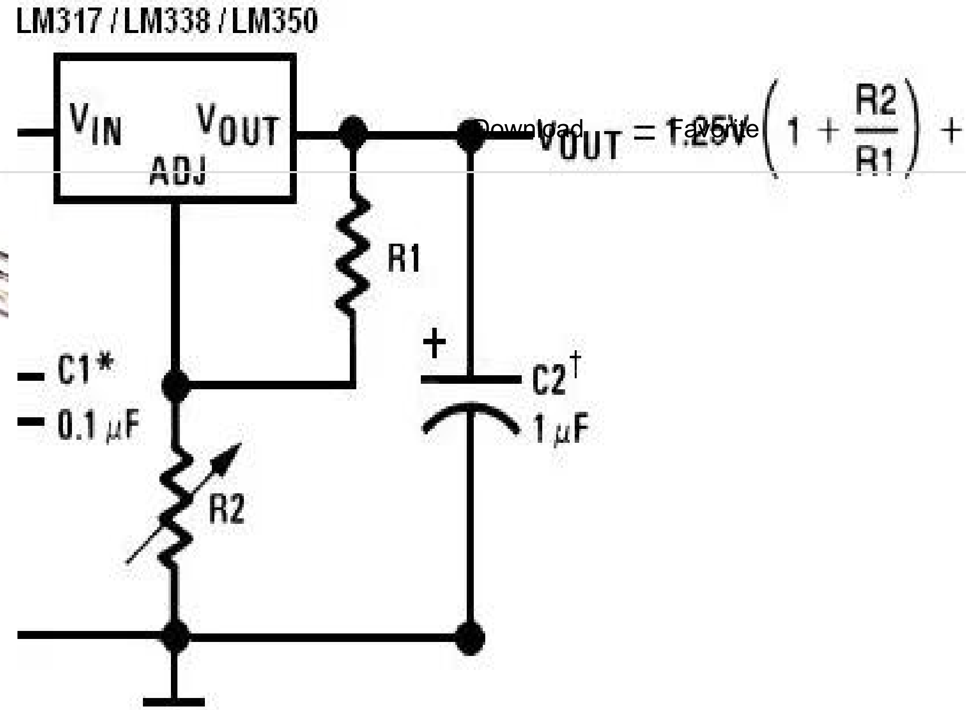
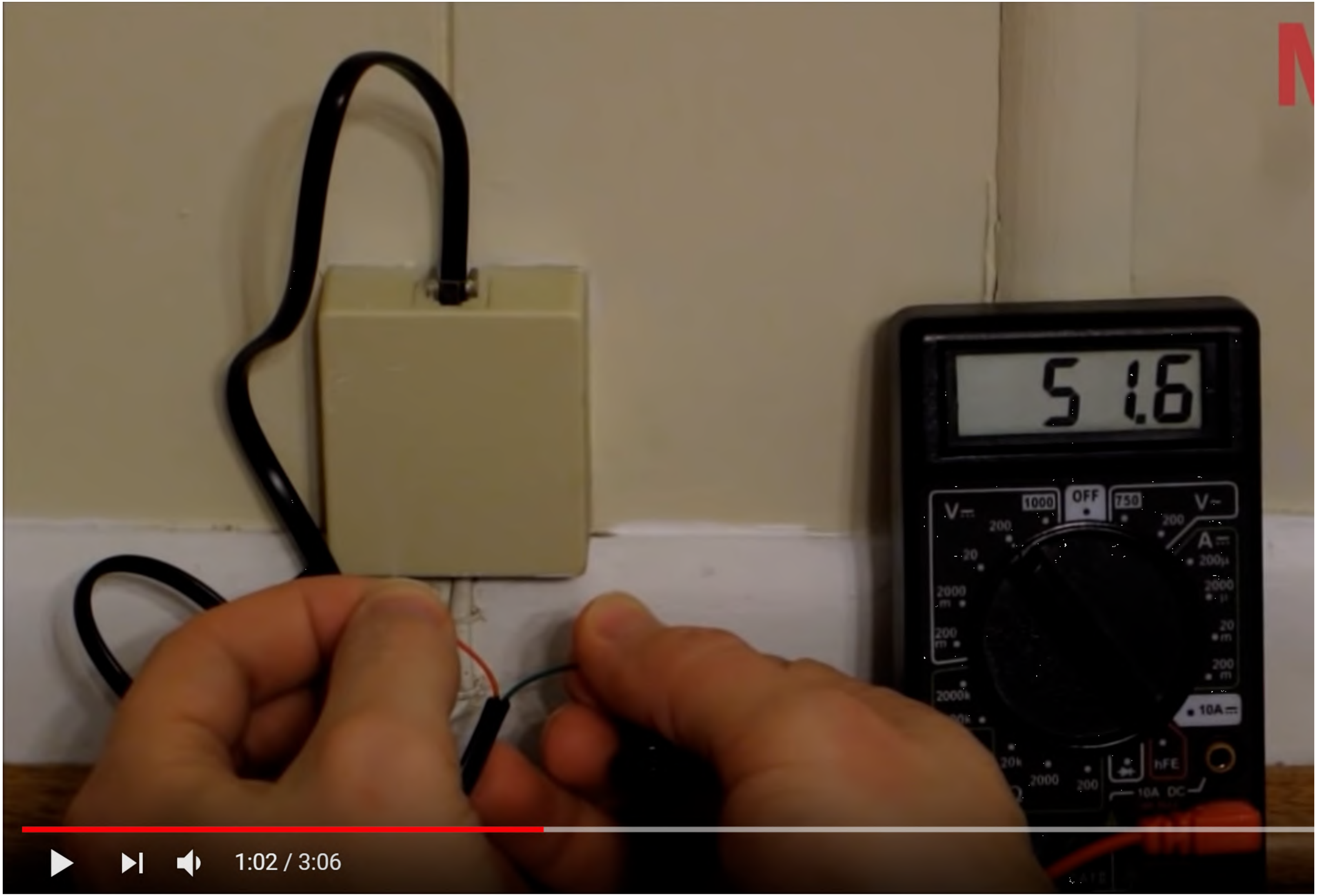
Step 4: Use Other Regulators for Other Output Voltages

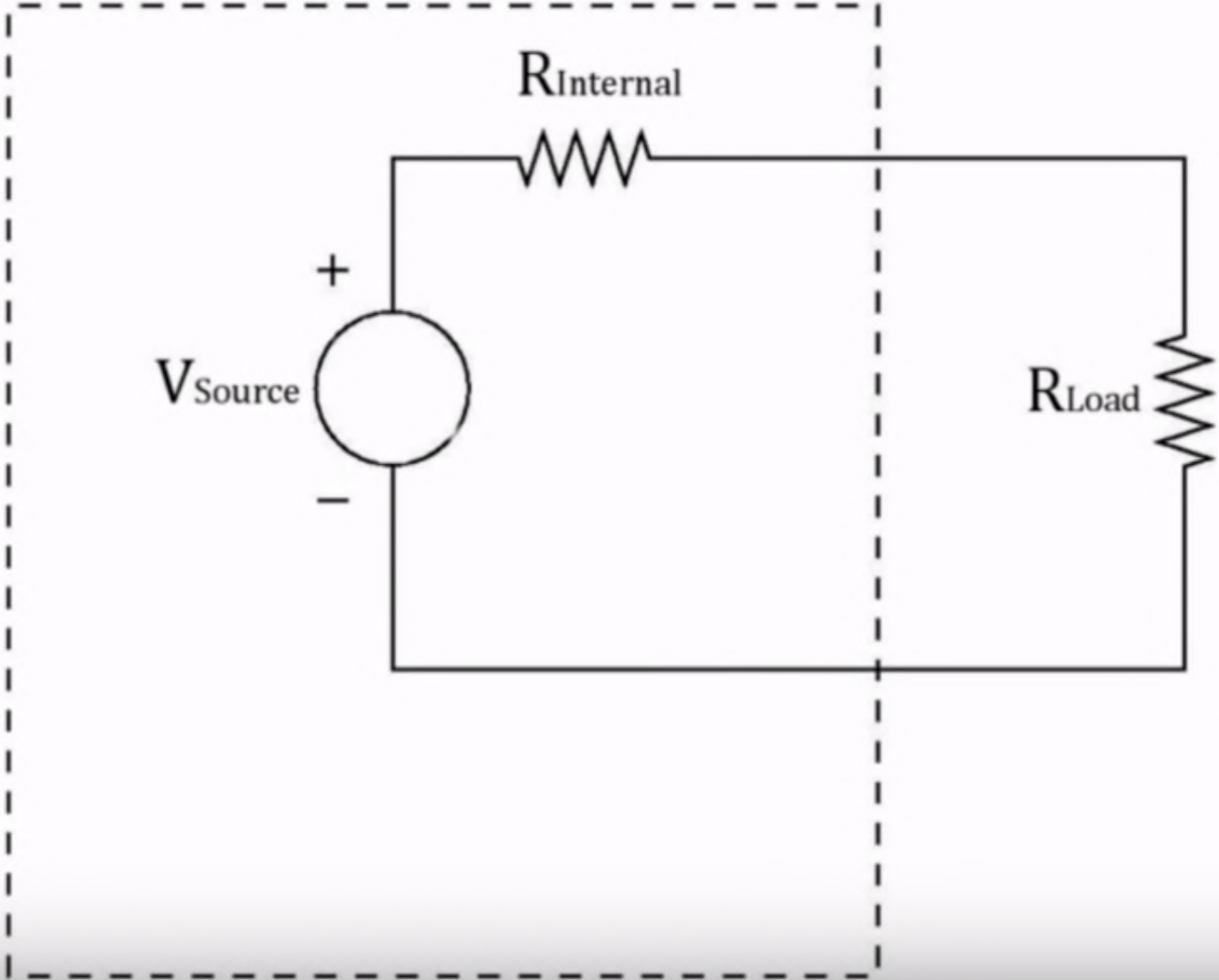




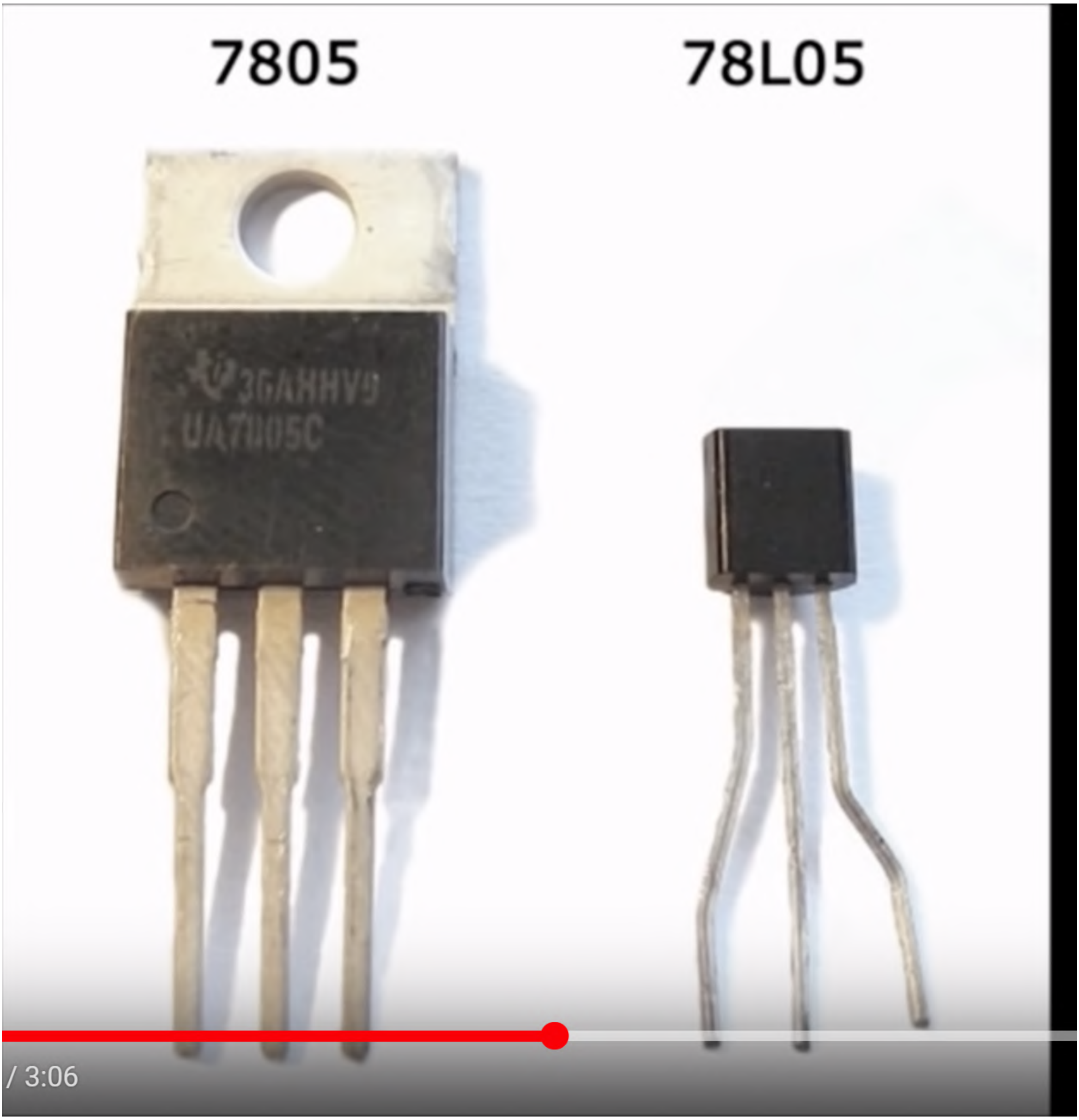
A 7805 regulator will work if you need an output of 5 volts but other kinds of voltage of voltage regulators are also available. Other voltages in the 78xx series include 6V, 8V, 9V, 10V, 12V, 15V, 18V, and 24V. In addition to these fixed value regulators, there are also variable regulators that let you set the voltage level with the use of a few external components. One such variable voltage regulator is the LM317 (http://www.ti.com/lit/ds/symlink/lm117.pdf). These are what you would use if you needed a different output voltage.

Step 5: Finished Phone Line Adapter Tool

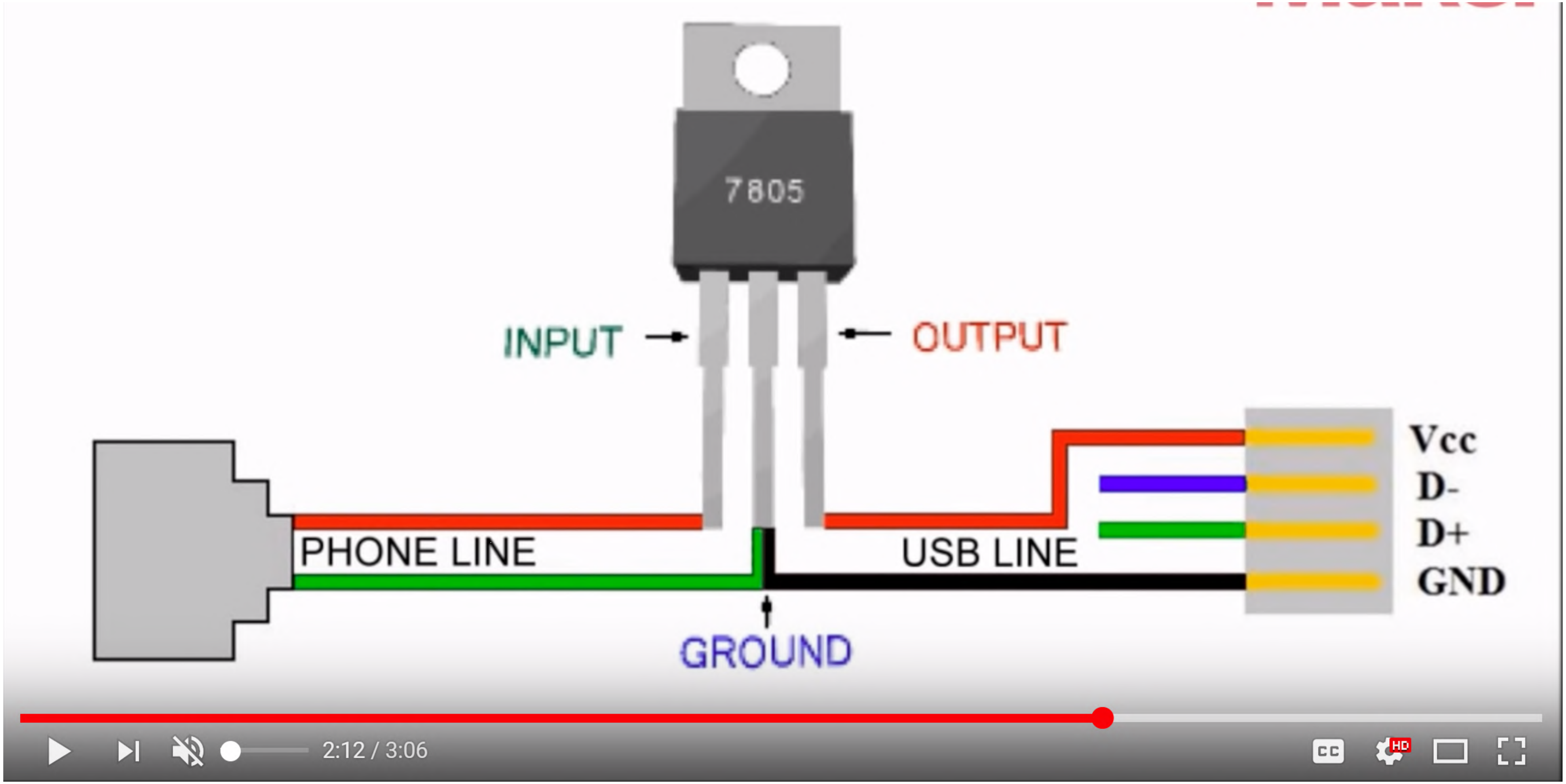

51.6
OFF
1000
750
hFE
10A
1:02 / 3:06

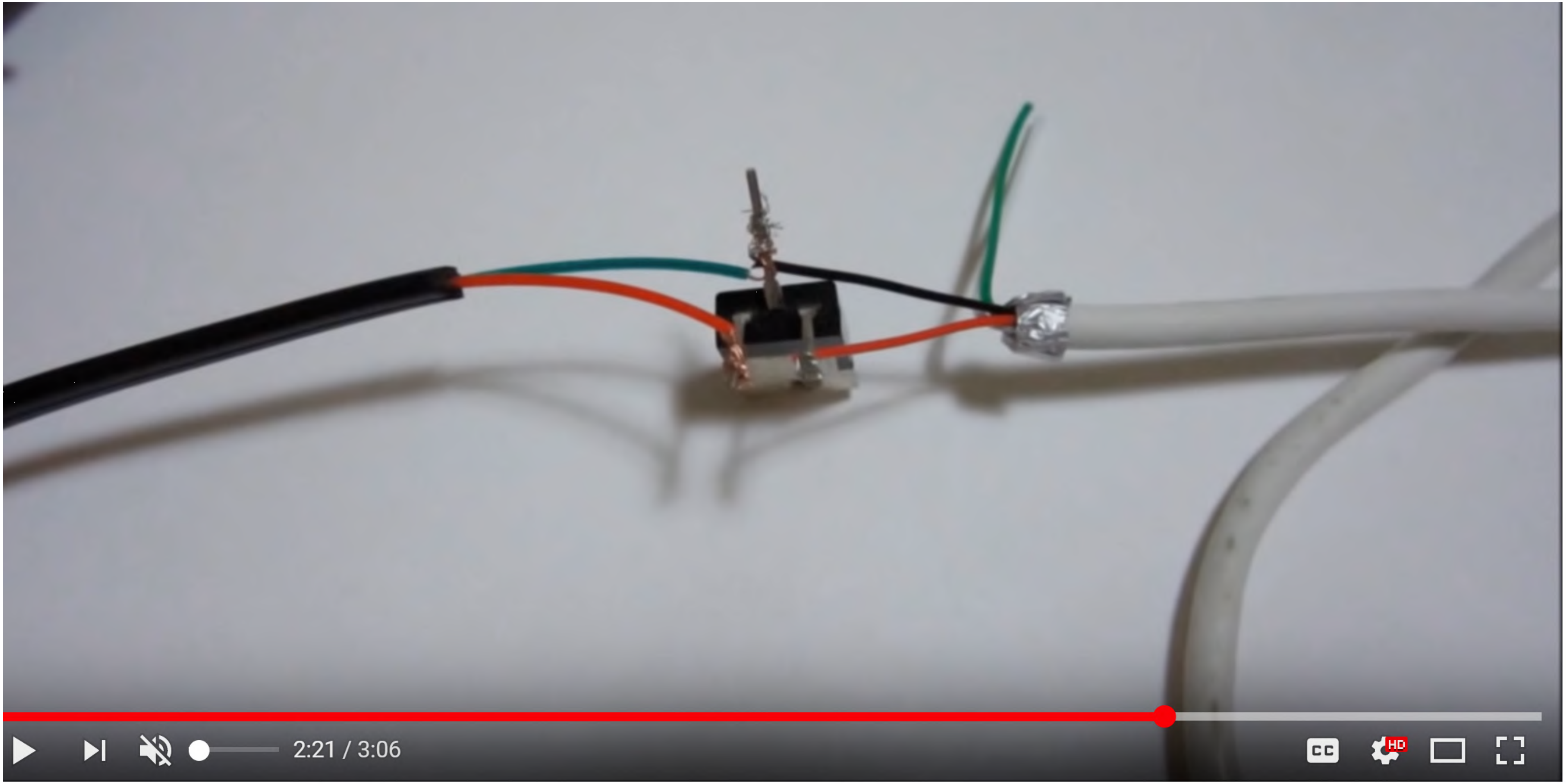


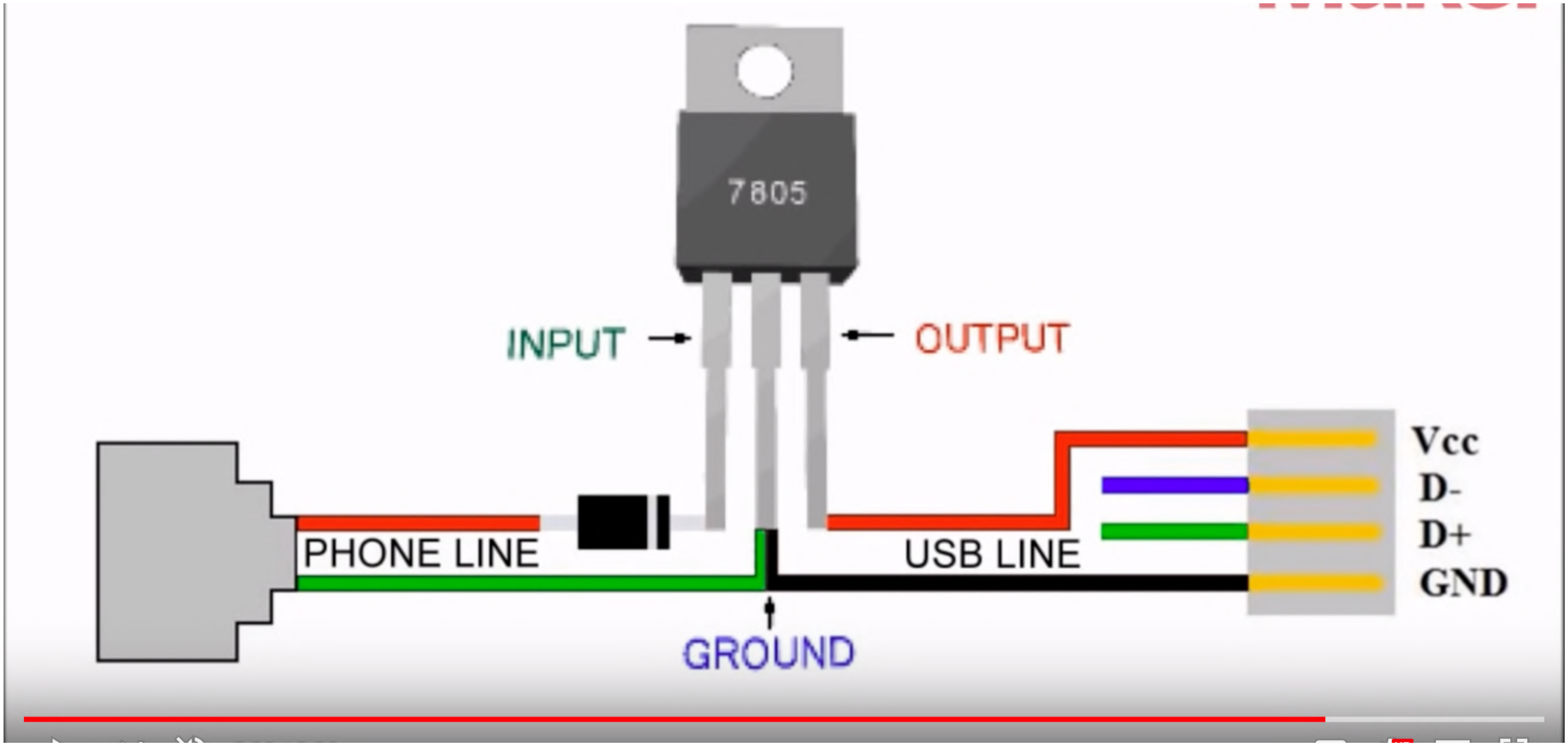
$$V_{Load} = V_{Source} \times R_{Load} / (R_{Load} + R_{Internal})$$


7805
78L05
UA7805C
/ 3:06


1:50 / 3:06


7805
INPUT
OUTPUT
PHONE LINE
USB LINE
GROUND
Vcc
D-
D+
GND
2:12 / 3:06


2:21 / 3:06
HD


7805
INPUT
OUTPUT
Vcc
D-
D+
GND
PHONE LINE
USB LINE
GROUND


MC
78T05CT
QZA807
2:33 / 3:06